

What is claimed is:

1. A method for communicating data between a host and an agent, the method comprising:
performing a first transaction at a first time between a host controller and a hub;
performing a second transaction between the hub and an agent based on the first
transaction at the first time; and
performing the first transaction at a second time between the host controller and the hub.

2. The method of claim 1, wherein the first transaction at the first time and the first
transaction at the second time are performed at a first communication speed or in accordance
with a first protocol.

3. The method of claim 1, wherein the second transaction is performed at a second
communication speed or in accordance with a second protocol.

4. The method of claim 1, further comprising performing a third transaction between the
first transaction at the first time and the first transaction at the second time.

5. The method of claim 1, wherein performing the first transaction at the first time includes,
sending from the host controller to the hub a first token packet including agent identification
information and a transfer indicator indicating that data needs to be transferred between the host
controller and the hub, and
transferring a data packet between the host controller and the hub.

1 6. The method of claim 5, wherein performing the first transaction at the first time
2 includes the processing by the host controller at least one of an acknowledgment, a handshake
3 indication, or a timeout indication.

1 7. The method of claim 5, wherein transferring the data packet between the host controller
2 and the hub includes sending the data packet from the host controller to the hub.

1 8. The method of claim 1, wherein performing the first transaction at the second time
2 includes,
3 sending from the host controller to the hub a first token packet including agent
4 identification information and a transfer indicator indicating that data needs to be transferred
5 between the host controller and the hub, and
6 transferring a data packet between the host controller and the hub.

1 9. The method of claim 8, wherein performing the first transaction at the second time
2 includes processing by the host controller at least one of an acknowledgment, a handshake
3 indication, or a timeout indication.

1 10. The method of claim 8, wherein transferring the data packet between the host controller
2 and the hub includes sending the data packet from the hub to the host controller.

1 11. A method for communicating data between a host and an agent, the method comprising:
2 receiving at a host controller from an agent a request to perform transactions periodically
3 with a first
4 period;
5 generating a frame template including a first transaction to be performed between the host
6 controller and a hub; and
7 performing periodically the first transaction of the frame template with a second period
8 that is less than or equal to half of the first period.

12. The method of claim 11 wherein the template period is greater than a duration of one
frame.

13. The method of claim 11, wherein the template period is less than a duration of one frame.

14. The method of claim 11, further comprising performing periodically with the first period
a second transaction between the hub and the agent.

15. The method of claim 14, wherein the periodically performed second transaction transfers
information between the agent and the hub, and the periodically performed first transaction
transfers the information between the host controller and the hub.

1 16. A method for communicating data between a host and an agent, the method comprising:
2 receiving at a host controller from an agent a request to perform transactions periodically
3 with a first period;
4 generating a first frame template and a second frame template each including a first
5 transaction to be performed between the host controller and a hub;
6 performing periodically with the first period the first transaction from the first frame
7 template; and
8 performing periodically with the first period the first transaction from the second frame
9 template such that the first transaction from the first template and the first transaction from the
10 second frame template are displaced in time by an interval.

11 17. The method of claim 16, wherein the first period is greater than or equal to a duration of
12 one frame.

13 18. The method of claim 16, wherein the interval is less than a duration of one frame.

14 19. The method of claim 16, wherein the interval is greater than a duration of one frame.

15 20. The method of claim 16, further comprising:
16 performing periodically with the first period a second transaction between the hub and an
17 agent;

wherein the periodically performed second transaction transfers data from the agent to the hub; and

wherein the periodically performed first transaction from the second template transfers the data from the hub to the host controller.

21. The method of claim 16, wherein the periodically performed first transaction from the first template transfers data from the host controller to the hub, further comprising:

performing periodically with the first period a second transaction between the hub and an agent; and

wherein the periodically performed second transaction transfers the data from the hub to the agent.

22. A digital system comprising:

a host controller;

a device driver adapted to operate the host controller to perform a first transaction at a first time between the host controller and a hub and to repeat the first transaction at a second time between the host controller and the hub;

wherein the hub is adapted to perform a second transaction with an agent based upon the first transaction at the first time; and

wherein the first transaction at the second time is repeated after the second transaction.

1 23. The system of claim 22, wherein the first transaction at the first time and the first
2 transaction at the second time may be performed at a first communication speed or in accordance
3 with a first protocol.

1 24. The system of claim 22, wherein the second transaction may be performed at a second
2 communication speed or in accordance with a second protocol.

1 25. The system of claim 22, wherein the host controller is adapted to perform a third
2 transaction between the first transaction at the first time and the first transaction at the second
3 time.
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1 26. The system of claim 22, wherein the host controller is adapted to send, during the first
2 transaction at the first time, a first packet including agent identification information and a
3 transfer indicator indicating that data needs to be transferred between the host controller and the
4 hub, and to transfer, during the first transaction at the first time, a data packet between the host
5 controller and the hub.

1 27. The system of claim 26, wherein the host controller is adapted to process, during the first
2 transaction at the first time, at least one of an acknowledgment, a handshake indication, or a
3 timeout indication.

1 28. The system of claim 26, wherein the data packet may be transferred from the host
2 controller to the hub.

1 29. The system of claim 22, wherein the host controller is adapted to send to the hub, during
2 the first transaction at the second time, a first packet including agent identification information
3 and a transfer indicator indicating that data needs to be transferred between the hub and host
4 controller, and to transfer, during the first transaction at the second time, a data packet between
5 the host controller and the hub.

1 30. The system of claim 29, wherein the host controller is adapted to process, during the first
2 transaction at the second time, at least one of an acknowledgment, a handshake indication, or a
3 timeout indication.

1 31. The system of claim 29, wherein the data packet may be transferred from the hub to the
2 host controller.

1 32. A digital system comprising:
2 a first hub controller adapted to perform a first transaction at a first time with a host
3 controller and to perform the first transaction at a second time with the host controller;
4 a second hub controller coupled to the first hub controller and adapted to perform a
5 second transaction with an agent based upon the first transaction at the first time; and
6 wherein the first transaction at the second time is performed after the second transaction.

1 33. The system of claim 32, wherein the first transaction at the first time and the first
2 transaction at the second time may be performed at a first communication speed or in accordance
3 with a first protocol.

4 34. The system of claim 32, wherein the second transaction may be performed at a second
5 communication speed or in accordance with a second protocol.

6 35. The system of claim 32, wherein the first hub controller is further adapted to perform a
7 third transaction between the first transaction at the first time and the first transaction at the
8 second time.

9 36. The system of claim 32, wherein the first hub controller is adapted to receive from
10 the host controller a first packet including agent identification information, a transfer indicator
11 indicating that data needs to be transferred between the host controller and the first hub
12 controller, during the first transaction at the first time, and to transfer a data packet between the

5 first hub controller and the host controller, during the first transaction at the first time.

1 37. The system of claim 36, wherein the first hub controller is adapted to send to the
2 host controller at least one of an acknowledgment or a handshake indication during the first
3 transaction at the first time.

1 38. The system of claim 36, wherein the data packet may be transferred from the host
2 controller to the first hub controller.

1 39. The system of claim 32, wherein the first hub controller is adapted to receive from
2 the host controller a first packet including agent identification information and a transfer
3 indicator indicating that data needs to be transferred between the first hub controller and the host
4 controller, during the first transaction at the second time, and to transfer a data packet between
5 the first hub controller and the host controller during the first transaction at the second time.

1 40. The system of claim 39, wherein the first hub controller is adapted to send to the host
2 controller at least one of an acknowledgment or a handshake indication.

1 41. The system of claim 39, wherein the data packet may be transferred from the host
2 controller to the first hub controller.

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